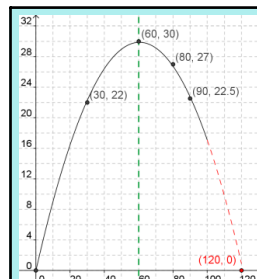
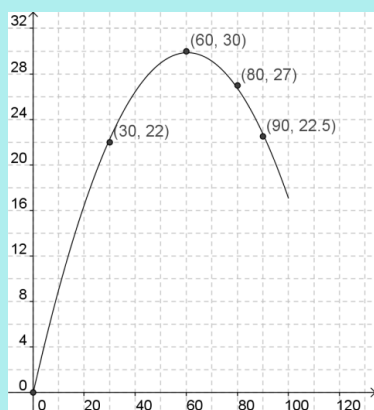


Data from the flight of a golf ball are graphed below. Identify key features that could be used to model the path using factored form or standard form.

$$y = a(x - s)(x - t) \quad y = ax^2 + bx + c$$



- one zero at (0, 0)
- y-intercept at (0, 0)
- max at (60, 30)
- axis of symmetry  $x = 60$
- other zero must be at (120, 0) by symmetry

standard  
 $y = ax^2 + bx + c$

factored  
 $y = a(x - s)(x - t)$

### L10(3.3) - Modelling Quadratics Using Factored and Standard Form

- 1) Sketch the parabola, if possible.
- 2) Identify the key properties given.
- 3) Use symmetry to deduce other key properties.
- 4) Select the equation based on key properties:  
factored form: at least one zero, two other points  
standard form: y-intercept, two other points
- 5) Substitute given information or points to solve for any missing values.
- 6) Does your answer make sense? Is there agreement with key features? Can you predict others?

Ex.1 Find the equation, in factored form, of the quadratic that passes through the points  $(-3, 0)$ ,  $(5, 0)$  and  $(7, 2)$ .

$$y = a(x - s)(x - t)$$

$$y = a(x + 3)(x - 5)$$

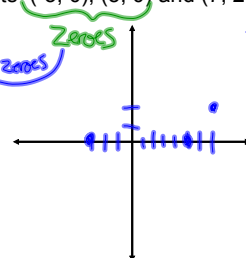
$$2 = a(7 + 3)(7 - 5)$$

$$2 = a(10)(2)$$

$$\frac{2}{20} = \frac{20a}{20}$$

$$a = \frac{1}{10}$$

$\therefore$  the equation is  
 $y = \frac{1}{10}(x + 3)(x - 5)$



Ex.2 Find the equation of the parabola, in factored form, that has only one zero which is 2, and that passes through the point (5, -2).

$$y = a(x-s)(x-t)$$

$$y = a(x-2)(x-2)$$

$$y = a(x-2)^2$$

$$-2 = a(5-2)^2$$

$$-2 = a(3)^2$$

$$\frac{-2}{9} = \frac{9a}{9}$$

$$a = -\frac{2}{9}$$

Sub in to  
Solve a

added  
symmetrical  
point (6, -2)

$\therefore$  the equation is

$$y = -\frac{2}{9}(x-2)^2$$

Ex.3 A bird swoops from a branch 10 m above the ground. After 3 seconds it is 1 m above the grass, and then it flies to a perch in another tree. Assuming the path is approximately parabolic, model the flight of the bird.

$$y = a(x-h)^2 + k$$

$$y = a(x-3)^2 + 1$$

$$10 = a(0-3)^2 + 1$$

$$10-1 = a(-3)^2$$

$$\frac{9}{9} = \frac{9a}{9}$$

$$y = ax^2 + bx + 10$$

$$\frac{6, 10}{10 = a(6)^2 + b(6) + 10}$$

$$10-10 = 36a + 6b$$

$$0 = 36a + 6b$$

$$0 = 36a + 6b$$

$$0 = 36a + 6b$$

$$0 = 36a + 6b$$

$$0 = 36a + 6b$$

$$0 = 36a + 6b$$

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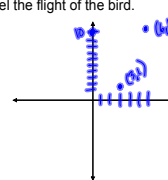
$$0 = 36a + 6b$$

$$0 = 36a + 6b$$

$$0 = 36a + 6b$$

$$0 = 36a + 6b$$

$$0 = 36a + 6b$$



$$1 = a(3)^2 + b(3) + 10$$

$$-9 = 9a + 3b$$

$$-9 = 9a + 3b$$

$$-9 = 9a + 3b$$

$$-9 = 9a + 3b$$

$$-9 = 9a + 3b$$

$$-9 = 9a + 3b$$

$$-9 = 9a + 3b$$

$$-9 = 9a + 3b$$

$$-9 = 9a + 3b$$

$$-9 = 9a + 3b$$

Assigned Work:

p.175 # 1, 2, 4, 6, 9ab, 11, 15\*